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Rutusmita Mishra
Ph.D. Research Scholar, NTA
NET, Lecturer (G) and S.C.S.
Autonomous College, Puri,
Odisha, India

Amiya Ranjan Jagadev
UGC NET, Lecturer (G), P.G.
Department of Geography,
S.C.S. (Autonomous) College,
Puri, Odisha, India

Dr. Sujata Mishra
Professor, Former Principal,
P.G. Department of
Geography, S.C.S.
(Autonomous) College, Puri,
Odisha, India

Lipsa Rani Das
Laboratory Assistant, P.G.
Department of Geography,
S.C.S. Autonomous College,
Puri, Odisha, India

Corresponding Author:
Rutusmita Mishra
Ph.D. Research Scholar, NTA
NET, Lecturer (G) and S.C.S.
Autonomous College, Puri,
Odisha, India

Assessment of the farming productivity in Puri district of Odisha: A block wise analysis

Rutusmita Mishra, Amiya Ranjan Jagadev, Sujata Mishra and Lipsa Rani Das

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Abstract

Agricultural sector in India contributes nearly one half of the national income, providing jobs to nearly three fourths of the total population. Agriculture plays an important role in the economic developmental process of a country and continues to be the most dominant sector in Puri district. Agricultural productivity has been an important issue as the population continues to increase in recent times. The concept of agricultural productivity has been extensively used to explain the different patterns of agriculture and spatial organization over space. Agricultural productivity and efficiency have been assessed by different scholars in contemporary times by using different statistical measures and techniques. In this light, this research paper attempts to identify spatial pattern of Agriculture Efficiency Index in the study area that includes the eight blocks of Puri district like Brahmagiri, Kanas, Delanga, Satyabadi, Pipili, Nimapada, Gop and Kakatpur which fall under immediate cyclone prone coastal areas of Puri District. The data for this study was collected from District Statistical Handbook (Agriculture Statistics and factsheet), Dept. of Agriculture and Farmer's Empowerment produced by Govt. of Odisha (2012-16) including both the Rabi and Kharif produce. Among various productivity index methods, the researcher has chosen S.S. Bhatia Method to calculate the crop efficiency index because of its detailed analysis and profound accuracy.

Keywords: Agricultural efficiency index, agricultural productivity, dispersion, Puri

Introduction

"Agriculture is the lifeline and backbone of Indian economy." Though the economic outcome made by the agricultural sector in the last five decades is one of the biggest success stories of free India, but significant achievements in comparison to other developed agrarian countries are yet to be achieved. Agriculture and allied activities solely constitute the single largest contributor to the gross domestic product of Odisha. Agriculture is the means of livelihood of about two-third of the working population in our country. In Odisha, increase in agricultural production of any area which is under cultivation highly depends upon the use of high-quality seeds, increasing irrigation facilities, water resource management, rational use of pesticides, cropping patterns and involvement of agricultural research. However, the study propounds a great deal of difference in the agricultural production in selected blocks of Puri district, which requires a detailed inspection to overcome the unequal production of crops and cereals among the study area. In this context, for the present study, the productivity efficiency index was calculated by using S.S. Bhatia method and the calculated values are grouped by using the dispersion of range which are there after categorised as High Productivity, Medium Productivity, and Low Productivity Regions. The Agricultural efficiency index is helpful for determining the suitability and productivity of agricultural crops which is helpful in identifying the spatial distribution and pattern over geographical regions. Further, this method is highly useful for demarcation and identification of agricultural areas in Puri district which will facilitate the planners and policymakers to make decisions by considering the outcome of the Agricultural efficiency Index that may lead to better performance in the research area.

Review of Literature

According to Stamp, (1952) ^[26] the study of agricultural productivity has been attempted by many scholars by advising and improving different techniques. Shafi (1960) ^[25] determined the agricultural productivity on a global scale by selecting a number of countries and some major crops. The areal unit and ranking co-efficient were derived.

Khusro analyzed that many others measured the agricultural productivity in terms of grain equivalents per head of population. Determining output in relation to input or output - input ratio and profitability of farming measured in terms of the return for the sum total of human efforts or paid-out-cost in relation to the output.

Sapre and Deshpande (1964) and Bhatia (1967) ^[14] elaborated by giving weightage to the ranking order of the output per unit area with the percentage share under each crop have calculated the productivity. Buck applied his technique in determining the agricultural efficiency in Uttar Pradesh. Cantor studied Furrow irrigation as very common because it is adaptable to a great variety of land slopes and soil texture. It can be used with either large or small streams of irrigated water.

Singh analyzed in developing countries land is limited to permit any expansion of cultivated area and the increasing pressure of population on land compels the geographers and agricultural scientists to think for the improvement of agricultural efficiency. Hussain (1976) measured by money value of productivity per unit area.

Jasbir Singh (1976) correlated yield and concentration indices ranking co-efficient method is adopted, it gives due weight age to per hectare yield area occupied and ranking of various crops he also studied. According to Murthy (1976) irrigation, the basic input in most parts of the cultivated land in our country has played a vital role in stepping up food production, as other inputs like fertilizers improved seeds etc. contribute their due share only when assured water supply is available.

Objectives

To find out agriculture productivity in selected blocks of Puri District.

Database and Methodology

The present study relies upon the secondary data collected from Online Agriculture Statistics, Dept. of Agriculture and Farmer's Empowerment, Govt. of Odisha by taking eight blocks viz. Brahmagiri, Kanas, Delanga, Satyabadi, Pipili, Nimapada, Gop and Kakatpur into account out of 11 blocks due to non-availability of data for all the blocks. In this study Firstly, major crop productivity is measured and the productivity indices have been calculated on the basis of statistical technique formulated by S.S. Bhatia and maps are prepared accordingly for comparative study of spatial distribution. The yield index of each crop is calculated by the equation given below:

Dr. S.S. Bhatia's Agricultural Efficiency Method

Agricultural efficiency (Ei) can be measured in four ways (Bhatia, 1967) ^[14]

- Output per unit area.
- Output and input ratio.
- Output per unit of labour applied.
- Output in terms of grain equivalents per head of population.

In this study Bhatia's method has been adopted to measure agricultural efficiency (Ei) following these steps:

1. Agricultural Efficiency Ei is = Composite index of district "i"

Where it is Eyij. Ci/

$$E_{ij} = \frac{\text{Yield of crop "j" in the district "i"}}{\text{Yield of region}}$$

2. Cij = Proportion of the area under crop "i" in the "i"th district to the total area under all crops in district "i"

3. Ei = Agricultural Efficiency Index

$$\frac{I_{Ya}.Ca + I_{Yb}.Cb + I_{Yc}.Cc + \dots + I_{Yn}.Cn}{Ca + Cb + Cc + \dots + Cn}$$

Where, Ei is the agricultural efficiency index.

IYa, IYb, IYc, IYn are yield indexes of various crops. Ca, Cb, Cc, Cn represent the proportion of crop land to different crop.

Analytics and Discussion

A brief study of the regional character is attempted in this study which is useful for understanding the basis of distributional pattern of crops and its intensity over specific blocks. The Puri district lies around the latitudes 19° and longitudes 84°29'E. It has a geographical area of 3051 km² or 264988 Hac. It has a varied geographical and geological divisions depending upon the available rock types, soil, vegetation, water bodies and climate. The whole of the district may be divided into two dissimilar natural divisions like:

1. The littoral Tract The strip of the country lies between the alluvial and the Bay of Bengal. It assumes the form of a bare but sandy ridge which stretches along the sea-shore for the full length of the District, Varying from 6.5 km. to a few hundred metres in width. Similarly, Accumulations of windblown sand give rise to ridges parallel to the coast. It forms the dividing line between the Chilika lake and the ocean.
2. The Level Alluvial tract region which is full of villages and rice fields, watered by a network of channels, through which the water of distributaries of the most southerly branch of Mahanadi, find their way to the sea. There is no hill in Puri District except a small cultivate land are under plough. Generally, biali or autumn rice, sarada or winter rice and dalua or spring rice these three types of rice are cultivated.

By using S.S. Bhatia's Agricultural Efficiency Index method five food crops are considered like Rice, wheat, Pulses, oilseed and sugarcane, which are grouped accordingly. For this analysis, eight blocks viz. Kanas, Satyabadi, Gop, Kakatpur, Nimapada, Brahmagiri, Delanga and Pipili

1. **High agricultural productivity:** High agricultural productivity mainly found in Kanas in the study area. High agricultural productivity in Kanas can be attributed to a combination of factors including favorable soil conditions, access to irrigation, and potentially, the implementation of improved agricultural

practices. The coastal location of these areas also influences the types of crops that can be cultivated, with rice being a dominant crop in the region. In this block availability of irrigation facilities is well-suited for rice cultivation, and the implementation of improved rice varieties and cultivation techniques (such as direct seeding) has further enhanced productivity. In Kanas Block irrigated area under canal is 71.74%, well and tube wells 26.75% and lift 0.31% (Mishra K.C., 2020) [19]

2. Medium agricultural productivity: The medium agricultural productivity has been observed in the three blocks mainly Nimapada, Brahmagiri and Delanga which is attributed to traditional age-old agricultural practice and low budgetary allocation in agricultural sector. Similarly, From the analysis of landholdings and land operation of Nimapada, Brahmagiri and Delanga block, it is revealed that the skewed distribution of landholding is a great obstacle for agricultural development in these blocks. In Brahmagiri and Delanga block, Paddy is the Principal crop followed by ragi, pulses, vegetables, oil seeds, jute and betel-vine. During 2016-17, the total production of paddy was 36,99,496 quintals. The minor crops cultivated in the district are wheat, ragi, greengram, black gram, horsegram, til, groundnut, mustard, potato, jute, sugarcane etc. During 2016-17, the production of wheat is 750 quintals, ragi is 165 quintals, greengram is 10,507 quintals, blackgram is 27,648 quintals and horsegram is 5,819 quintals. Likewise, the production

of til, groundnut, mustard, potato, and sugarcane are 2.54 quintals, 34,529 quintals, 30 quintals, 52,624 quintals, and 1,33,477 quintals respectively. (Mishra K.C., 2020)

3. Low agricultural productivity: The low agricultural productivity found in three blocks of Puri district like Pipili, Satyabadi, Kakatpur and Gop which is attributed to Traditional Farming Practices which are less efficient and yield lower outputs. Similarly Lack of awareness about modern, high-yielding crop varieties and technologies hinders productivity in blocks like Gop, Satyabadi and Kakatpur. It is also observed that a significant portion of agricultural land in the region is rain-fed, making it highly susceptible to variations in rainfall patterns and inadequate irrigation infrastructure limits the ability to manage water resources effectively, especially during dry spells in Pipili block. In Kakatpur and Gop poor road networks and inadequate transportation facilities hamper the timely and cost-effective movement of agricultural produce. Similarly, a large number of farmers own small and fragmented plots of land, making it difficult to adopt modern, capital-intensive technologies. Whereas this fragmentation increases the cost of farming operations and reduces overall efficiency. Another most promising reason behind low agricultural productivity in Kakatpur and Gop particularly is hitting of Tropical cyclones in every couple of years making it difficult to manage for agricultural production. (Mishra K.C., 2020) [19]

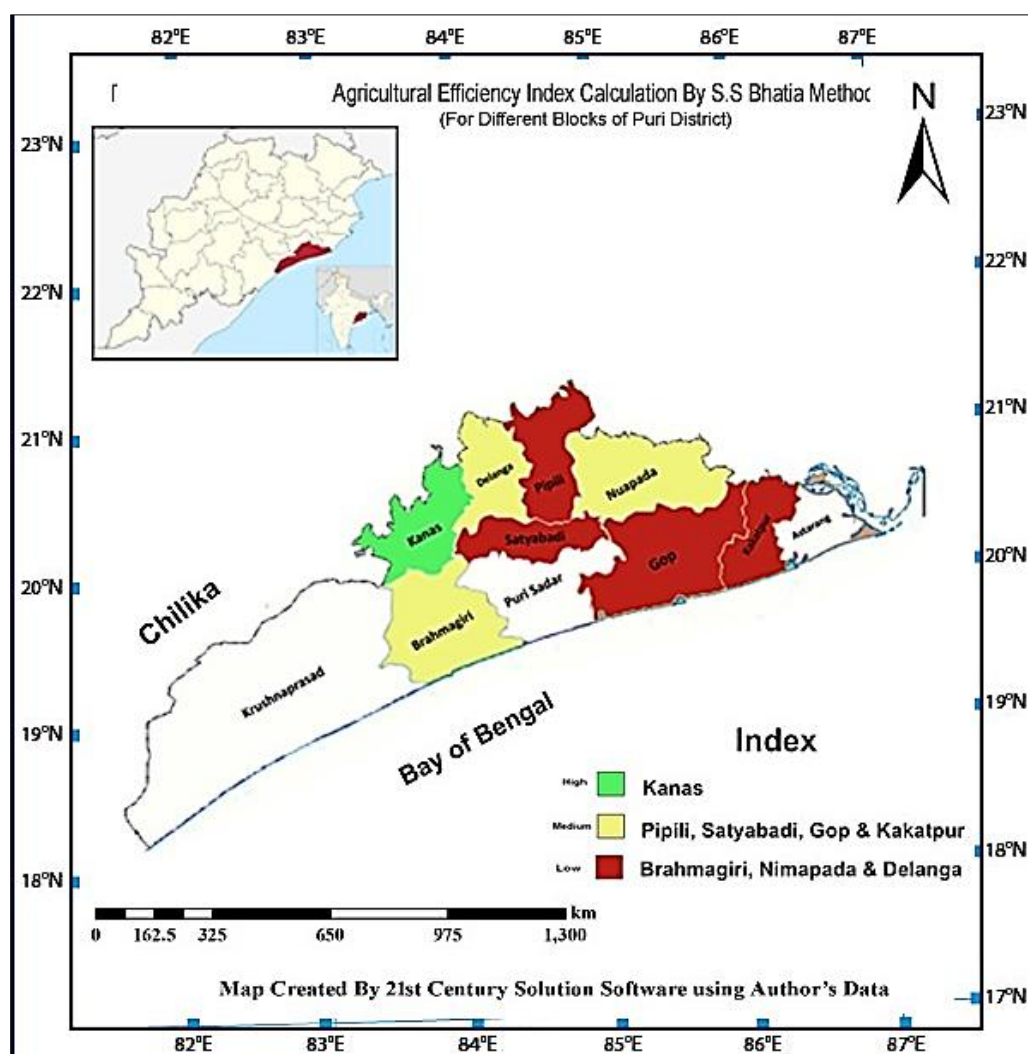


Table 1: Showing Agricultural Efficiency calculated by author on the basis of Bhatia method.

Blocks	Calculation of $ij = Eyij \cdot Cij$	ECij (rice+ wheat+ sugarcane+pulses +oil seeds)	$Ij = Eyij \cdot Cij / ECij \cdot 100$
Nimapada	1.15	0.99	116
Satyabadi	0.74	0.99	75
Pipili	0.66	1	66
Delanga	1.14	1	114
Kanas	1.56	1	156
Kakatpur	0.63	0.99	64
Brahmagiri	1.16	0.99	117
Gop	0.59	1.03	57

Table 2: Showing Categorisation and grouping of agricultural Blocks on the basis of Dispersion (Range).

High	123-156	Kanas
Medium	90-123	Nimapada, Brahmagiri and Delanga
Low	57-90	Satyabadi, Pipili, Kakatpur and Gop

Conclusion

From the above discussion it is concluded that the Puri district as a whole is rich in natural resources. The agroclimatic condition and topography are also favourable for exploitation of natural resources. However, the fragmented holding and insufficient irrigational facilities are the main obstacles for agricultural development followed by regular hitting of tropical cyclones. Likewise, modern methods of farming and adoption of large-scale farm mechanism could not pick up to the desired extent due to the fragmentation of land holdings. The study found agriculture is the predominant sector but has remained stagnant in the blocks of Kakatpur, Gop and Satyabadi due to poor infrastructural support. Puri is characterised as a rural and agrarian economy and about 70% of the total population of Puri depends on agricultural practice. Agriculture is the mainstay of the people of the district considering the soil condition, favourable climate, rainfall and cultivable land and Puri district has an ample scope for agricultural opportunities. As to the irrigation facilities 1,57,904 hectares of potential areas created in the district during the year 2016-17 from all sources. Out of which 89,658 hectares is of potential created during the Khariff and that of 68,246 hectares during the Rabi showing the Percentage of 47.50 and 36.16 respectively. The Major portion of irrigation is received from the major irrigation provided by Mahanadi Delta- II. Under lift irrigation, 291 numbers of L.I. Points with a capacity of 7,326 hectares have already been handed over to panipanchayats. Lastly in this particular study as blocks are assigned into three groups like high, moderate and low agricultural productivity blocks, it may help in formulating the block specific strategies for overall development of low and medium productivity blocks. Similarly the physio-cultural situation of these blocks requires sustained planning effort to accelerate the process of agricultural development particularly in blocks of Astaranga, Kakatpur and Pipili as they are the periodic cyclone affected blocks being present in coastal region of India.

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